the archean to the base of the bird's-eye limestone was found to be of great interest. At Glen Falls, Essex, Ausable Chasm, and Chazy, N.Y., sections were taken, and collections formed.

The sections taken at Highgate Springs, Swanton, St. Alban's, and Georgia, Vt., by Professor Jules Marcou, were critically examined, and large collections of fossils secured. The data obtained show the dip of the Winooski marble series and the slates above, carrying the Olenellus fauna, to be the same. The five hundred feet of magnesian limestone, with its interbedded arenaceous layers, conformably underlie the Olenellus beds. The fauna at the Georgia locality was increased by the addition of eight species not before reported as occurring there.

NOTES AND NEWS.

MR. H. M. STANLEY contributes to the *New-Englander* an interesting, and, on the whole, clearly written study, entitled 'Evolution as bearing on method in teleology.' The essay follows a train of thought somewhat similar to the one stated in a book that appears almost at the same time, and that we reviewed recently; viz., Mr. Hicks's Critique of design arguments. Mr. Stanley is thankful to the doctrine of evolution for having rid teleology of a useless and somewhat dangerous argument, — the argument from mere ignorance; i.e., from our incapacity to explain certain singular or wonderful things save by supposing a powerful being directly working to produce them. This argument, which covers, on the whole, much the same ground as is covered by what Mr. Hicks calls teleology in the narrower sense, is regarded by Mr. Stanley as superseded by the doctrine of evolution. We now see that nature ought to be regarded as a 'practically infinite series of second causes;' so that, if we are now ignorant of the cause of any phenomenon, we still have a right to expect to find for it hereafter a purely natural cause. Every thing has grown; and we have to view nature as a vast and perfect machine, self-supplying, self-regulating, and not needing any workman to stand by to watch the steam-gauge, to put in the material, or to oil the bearings. Yet this view is not atheistic, according to Mr. Stanley; for the supposition of a designing intelligence remains, only this intelligence is 'immanently behind phenomena.' By this being, all things consist. In fact, the more nearly automatic the machine, the more perfect the contriving intelligence. "If an automatic locomotive-machine is a sign of very great intelligence, how much greater intelligence would an automatic universe-machine exhibit? . . . Teleology has been called a 'carpenter theory,' but a teleology which views the universe as a practically infinite automatic machine would forever destroy the force of any such epithet." In other words, as we understand Mr. Stanley, a 'practically infinite' carpenter would be something much better than a carpenter; and teleology gains rather than loses when the doctrine of evolution shows that the carpenter's tinkering of his work, if there is any tinkering, is practically infinitesimal. All this seems to us not at all novel; but, for the most part, it is very well put, and worth saying.

But when we inquire of any of these evolutionary design arguments, not how they defend themselves against the charge of atheism, but how they demonstrate theism, we are disappointed. Mr. Hicks, as we saw in reviewing him, is very definite on this point as to what he attempts, and as to what he does not attempt; but his definiteness only serves to show his weakness. He declares that order, as such, is proof of intelligence, but adds that the proof is solely inductive. Men are orderly because they are intelligent: hence nature, if orderly, must be somehow associated with intelligence. We answered this induction by asking whether all brilliantly colored objects must needs be visited by insects merely because the colors of flowers depend upon *their* relations to the habits of insects. But with Mr. Stanley we hardly have room for so definite a criticism; for, though his argument in favor of theism, in so far as he suggests one at all, seems to be inductive, it seems also most carefully to shun any such definite statement as should make it definitely answerable. The vast machine needs, it would seem, a controlling intelligence, which does not interfere with it, and yet does somehow direct it. The 'practically infinite series of second causes' is not enough by itself, and we must somehow get outside of it to find a designer; and, when we ask how the designer is related to the series of second causes, we get the charmingly innocent answer, that he is 'immanently behind phenomena,' — an expression that seems to us either mere words, or else an excellent Irish bull. Perhaps Mr. Stanley can explain this phrase for us; but meanwhile, as one casts about for an interpretation, one is reminded strongly of Brer Fox, in the wonderful tar-baby story, as he 'lay low' in the bushes, watching his creation the tar-baby while it slowly intrapped Brer Rabbit. Possibly Brer Fox was 'immanently behind' that tar-baby. But our criticism is only of bad arguments and of obscure expressions, not of the view itself that the order of the universe implies an intelligence. The latter we hold as positively as Mr. Hicks or Mr. Stanley, only we insist that the question is not in the least one of inductive science. The 'design' argument in all its accustomed forms is bad, because it is an inductive argument, applied as true empirical science never applies any inductive arguments; viz., to matters wholly beyond the limits of phenomenal existence. The whole question is one of philosophy. Not as a result of induction, but as an implied premise of the inductive, or of some other rational thinking process, must this doctrine of intelligence in nature be established, if at all; and therefore only a critical philosophy, that examines the assumptions lying at the basis of the thinking processes, has any business with the question. Empirical science, as such, has simply once for all 'no need of that hypothesis.'

— A fire broke out last week in the cellar of the building containing the geological collections at Amherst college. Fortunately it was discovered early, and put out by the students before any serious damage

was done. It will be recollected that the college lost the fine mineralogical cabinet of Prof. C. M. Shepard last year by fire; and the fear of a repetition of that disaster caused a too hasty removal of many objects from the lower floor, labels and specimens becoming sadly mixed. The wind was very high; and, had the fire gained greater headway, nothing could have saved the museum, or the observatory attached.

— Charles Leslie McKay of the U.S. signal-service, stationed at Nushegak, Alaska, was drowned in Bristol Bay last April, while engaged in collecting fishes for the U.S. national museum. Mr. McKay had done considerable work in ichthyology, his most important publication being a 'Review of the Centrarchidae,' in the Proceedings of the U. S. national museum for 1881.

— At its meeting, Oct. 27, the Philosophical society of Washington listened to a communication by Dr. T. N. Gill on the ichthyological results of the voyage of the Albatross, and to one by Prof. A. Graham Bell on fallacies concerning the deaf. Dr. Gill described two anomalous fishes, one of which required the institution of a new order. Professor Bell's paper was the subject of a lively debate.

— Those who have followed the discussions in SCIENCE on the St. David's rocks will be interested in a new phase of the controversy, introduced by a paper before the British association by Prof. J. F. Blake. The rocks below the Cambrian conglomerate have been described by Dr. Hicks as bedded rocks belonging to three distinct periods. The same rocks have been recently asserted by Dr. Geikie to be partly Cambrian, and partly intrusive. Professor Blake contends that they are pre-Cambrian in age, but form a very complete volcanic series, which may well be designated the Dimetian. The basis of the series is the Dimetian granite, serving as the core. This is surrounded by the more acid rocks, as the quartz felsites and the felspar porphyries (the so-called Arvonian); and the more outlying portions consist of very varying materials, chiefly rough ashes or agglomerate breccias, — on the east side finely-bedded 'halleflintas,' and on the north side many basic lava-flows. These are the so-called 'Pebidian.' The arrangement of these rocks shows the characteristic irregularity of volcanic rocks; and, though many portions are bedded, they have no dominant strike over the whole district. The Cambrian series, commencing with the conglomerates, is quite independent, and hangs together as a whole. In no case can a continuous passage be proved from the one series to the other: the junction is in most cases a faulted one; and, at the places where this is not so, the conglomerate lies on different beds of the volcanic series.

—At the meeting of the Boston society of natural history, Nov. 7, Prof. H. W. Haynes spoke of the agricultural implements of the New-England Indians, Prof. W. O. Crosby read a paper on the origin and relations of continents and ocean-basins, and Dr. M. E. Wadsworth gave brief notes on the lithology of the island of Jura, Scotland.

— Mr. George Shoemaker, a very industrious and promising young naturalist connected with the National museum, died in Washington on the 12th of October.

— Herr Jacobson, who has spent four years on the north-west coast of America in making ethnological collections for the Berlin museum, has recently returned, and will sail for Europe.

— Dr. Leonhard Stejneger has arrived in San Francisco, *en route* for Washington. He has spent a year in Bering Island in the study of its fauna, and in collecting remains of the extinct arctic sea-cow.

— The Hydrographic office has published a monograph (no. 4.), by Lieut. Southerland, upon the two August hurricanes. It contains abstracts from the logs of forty vessels which were near the path of one or both of these storms, a chart of the course of each storm, a diagram of the tracks of two barques which were near the path of the second hurricane, and sailing-directions for managing vessels when near similar dangerous cyclones. The projected paths resemble those previously published by the signal-office in the Weather review for August (SCIENCE, no. 37), but differ somewhat in detail. The latter were based upon the reports of more vessels than those enumerated by Lieut. Southerland. Some of the ships mentioned are common to the two reports; but doubtless a more accurate representation of the paths of the hurricanes could have been obtained, had all the data been combined in one report.

— Mr. J. B. Fell, C.E., gave a paper on the construction and working of alpine railways, at the recent meeting of the British association, which is thus reported in *Nature*. There are three alpine railways in existence at the present time, — the Mont Cenis and St. Gothard railways, which have been made with long summit tunnels, and with ordinary gradients; and the Brenner railway, that has been made with similar gradients, but without a long tunnel. The important question has now arisen, and has been taken into serious consideration by the governments and local authorities interested, as to how far it may be possible to make other trans-alpine railways, some of which are urgently needed, at a cost that would render them financially practicable; and, to accomplish this object, it has been proposed to effect a reduction of one-half or more of the cost, by carrying these railways over the mountain-passes by means of steep gradients and the use of the centre rail system, as it was adopted on the Mont Cenis railway. Upon these improved summit railways the same weight and number of trains could be run that are now running on the Mont Cenis tunnel railway; and, with the protection of avalanche galleries and covered ways, the regularity of the service would be maintained at all seasons of the year. The extra cost of working-expenses caused by working over a higher level than that of a tunnel line would, if capitalized and added to the cost of construction, still leave a clear net saving of more than one-half in the cost of construction, as compared with the cost of a tunnel railway. The result of the experiences of the last twenty-five years seems to point to the conclusion that a method of constructing alpine railways with long, non-paying tunnels, is a thing of the past. The future belongs

to the best system that can be devised for overcoming the difficulties of trans-alpine railways rather by adding to the powers of the locomotive-engine, and by other mechanical appliances for reducing the cost of traction on steep inclines, which methods are capable of indefinite improvement, than by burying in gigantic tunnels enormous sums of unproductive capital, that, when once expended, are irrecoverably lost.

— We learn from *Nature* that the electric railway from Portrush to the Giant's Causeway was opened Sept. 28 by Earl Spencer; and among others present, were Sir William Thomson, Sir William Siemens, and Sir Frederick Bramwell. It is over six miles long, and has cost £45,000. The line, after passing through the principal street of Portrush, follows the seaside road, a portion of a footpath six feet broad being reserved for the railway. The gauge is only three feet; and the gradients are very steep, — in places as much as one in thirty-five; and in parts of its course the curves are sharper than might have been desirable had the route which it takes been chosen by the engineers. The force to work it is generated by a waterfall in the river Bush, with an available head of twenty-four feet, the electric current being conveyed by an underground cable to the end of the tramway. The water-power passing through turbine water-wheels, which utilize the whole force of the fall, is said to amount to ninety horse.

— At the meeting of the Engineers' club of Philadelphia, Oct. 20, Mr. John Haug exhibited and described very complete sets of drawings for two vessels designed by him, — the one a tug-boat for the Philadelphia board of health, and the other a barge for the transportation of freight and passenger cars. Mr. J. H. Harden read a paper, prepared for publication as part of the Report of the second geological survey of Pennsylvania, relating to the "Early mining operations in Berks and Chester counties, including the present condition of the Jones mine." Prof. L. M. Haupt presented notes on conventional colors for drawing.

— Before the Biological society of Washington, at its meeting, Nov. 2, the communications were: Dr. George M. Sternberg, U.S.A., Micrococci; Dr. E. M. Schaeffer, Further remarks on manna, with exhibition of specimens; Dr. T. H. Bean, Arrested asymmetry in a flounder, with exhibition of specimens; Professor Lester F. Ward, Mesozoic dicotyledons.

— The autumn meeting of the Society of mechanical engineers, which has just closed in New York, has been unusually well attended, and some important lines of discussion have been drawn out. Considerable interest was shown in the proposed re-appointment of a board to supervise the work with the Watertown testing-machine.

— The Massachusetts agricultural experiment-station at the Agricultural college in Amherst, Mass., was established by an act of the legislature approved on the 12th of May, 1882. Its management is vested in a board of control, consisting of the governor of the state, two members of the state board of agriculture, two members of the board of trustees of the Massachusetts agricultural college, one member of the Massachusetts society for promoting agriculture, and the president of the Massachusetts agricultural college. The present officers of the station are all members of the college faculty, and are Prof. C. A. Goessmann, director and chemist; Prof. M. Miles, superintendent of field and stock experiments; and Prof. S. T. Maynard, superintendent of horticultural experiments, microscopist, and draughtsman. The station proposes to publish monthly bulletins, of which two have already appeared. The first contains an account of the organization of the station, and a general statement of its purposes, and also analyses of ten samples of fodders. The second and third bulletins contain analyses of four samples of fodders and of fifty-six of fertilizers and fertilizing materials.

— An extended review of the results of the German census of 1881 is given by Ch. Grad in the *Revue scientifique*, 1883, 109.

RECENT BOOKS AND PAMPHLETS.

Bachmann, O. Unsere modernen mikroskope und deren sämmtliche hilfs- und neben-apparate für wissenschaftliche forschungen. München, *Oldenburg*, 1883. 15+344 p., illustr. 8°.

Burr, W. H. The elasticity and resistance of the materials of engineering. New York, *Wiley*, 1883. 15+753 p. 8°.

Campagne, E. Les météores. Rouen, *Mégard*, 1883. 189 p., illustr. 8°.

Denza, F. La meteorologia e le sue più recenti applicazioni. Torino, *Speirani*, 1883. 364 p. 8°.

Fallet, C. Les mers polaires. Rouen, *Mégard*, 1883. 160 p., illustr. 8°.

Gérardin, L. Les bêtes, éléments de zoologie théorique et appliquée. Paris, *Masson*, 1883. 2+418 p., illustr. 18°.

Landolt, H., and **Börnstein**, R. Physikalisch-chemische tabellen. Berlin, *Springer*, 1883. 12+249 p. 8°.

MacCord, C. W. Kinematics: a treatise on the modification of motion, as affected by the forms and modes of connection of the moving parts of machines; illustrated by diagrams of mechanical movements, as practically constructed; for the use of draughtsmen, machinists, and students of mechanical engineering. New York, *Wiley*, 1883. 9+335 p. 8°.

Malte-Brun. Lectures géographiques: l'Europe, description générale. Limoges, *Barbou*, 1883. 141 p. 12°.

Ollivier-Beauregard. En Asie, Kachmir et Tibet, étude d'ethnographie ancienne et moderne. Paris, *Maisonneuve*, 1883. 144 p. 8°.

Petit, H. Notes sur l'habitat des coléoptères de France. Châlons-sur-Marne, *Martin*, 1883. 66 p. 8°.

Physik, die, im dienste der wissenschaft, der kunst und des praktischen lebens. Red. G. Krebs, unter mitwirkung von J. van Bebber, C. Grahwinkel, E. Hartwig. lief. i. Stuttgart, *Enke*, 1883. 112 p., illustr. 8°.

Reusch, H. H. Die fossilien führenden krystallinischen schiefer von Bergen in Norwegen. Autorisirte deutsche ausgabe von R. Baldauf. Leipzig, *Engelmann*, 1883. 4+134 p., 92 illustr., map. 8°.

Trautvetter, E. R. Incrementa florae phaenogamae rossicae. fasc. i. Berlin, *Friedländer*, 1882. 4+240 p. 8°.

Tschermak, G. Die mikroskopische beschaffenheit der meteoriten, erläutert durch photographische abbildungen. lief. i. Stuttgart, *Schweizerbart*, 1883. 12 p., 8 pl. 4°.

Van Overbeck de Meijer. Les systèmes d'évacuation des eaux et immondices d'une ville. Paris, *Baillière*, 1883. 143 p. 8°.

Weismann, A. Ueben die ewigkeit des lebens. Freiburg-i.-Br., *Mohr*, 1883. 79 p. 4°.

Weselsky, P., and **Benedikt**, R. Dreizig uebungs-aufgaben als erste anleitung zur quantitativen analyse. Wien, *Trefflitz & Deuticke*, 1883. 41 p., illustr. 8°.

Weyr, E. Die elemente der projectivischen geometrie. heft i.: Theorie der projectivischen grundgebilde erster stufe und der quadratischen involutionen. Wien, *Braumüller*, 1883. 9+231 p. 8°.

Witthaus, R. A. The medical student's manual of chemistry. New York, *Wood*, 1883. 370 p., illustr. 8°.

Wright, E. P. Animal life: being the natural history of animals. New York, *Cassell*, [1883.] 8+618 p., illustr. 8°.